Guidance for Managing BLM Data Standards

How to Adopt, Implement, and Maintain Data Standards

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Table of Contents

1.0 Applicability 2-1

2.0 Background 2-1

3.0 Roles and Responsibilities 2-5

4.0 Overview of the Steps 2-7

5.0 Propose Data Standard 2-9

6.0 Adopt Data Standard 2-11

7.0 Implement Data Standard 2-13

8.0 Maintain Data Standard 2-14

9.0 Information Resources 2-16

Addendum 1 Format and Content for a Data Standard Report 2-17
Addendum 2 Suggested Data Standard Adoption Team Composition 2-21
Addendum 3 Data Data Standard Adoption Business Process Diagrams 2-23
Addendum 4 Roles in Data Standard Adoption, Implementation, and Maintenance 2-29
Addendum 5 Proposal for a New Data Standard 2-33
Addendum 6 Data Standards Implementation Plan Format 2-37

1.0 Applicability

This guidance provides help for selecting, modifying, adopting, or creating data standards for Bureau of Land Management (BLM) business activities. It also covers implementing and maintaining those standards. It can be used in a variety of ways, from selecting an existing industry standard to the opposite extreme of developing a brand-new standard to meet a need that is not served by existing standards. Most of the time, it should be possible to adopt, or to adapt, existing standards for national use. However, this guidance also provides the steps to follow in developing a new standard. Less complicated efforts can pick and choose appropriate steps, so long as the consultation and approval actions are completed formally.

This guidance applies to all activities to establish data standards in the BLM. It applies at every organizational level of the BLM, and to all organizations including administrative and financial. All managers shall ensure that this guidance is followed within their area of accountability.

This guidance applies to all types of standards, however categorized. For example, it applies to what are commonly called content standards, display standards, data entry standards, quality standards, metadata standards, and all other categories of standards. In this regard, geospatial coordinates and related information are regarded as a special form of content standards, and are included within the scope of this guidance.[1]

An overview of the process to establish data standards is provided in Section 4.0.

2.0 Background

Data is a fundamental BLM asset. All decisions and management actions are based on BLM corporate data.[2] If BLM actions are to be legally defensible, the information used in the decision process must be correct, documented in standardized metadata, and available for inspection. To reduce government costs and to increase efficiency, data must be readily shared among programs, offices, and agencies that require the same information. This implies that data is collected to a common standard and is documented in a standard metadata[3] format. It also implies that the standardized data is then automated in a way that permits its ready use by a broad range of users, including internal BLM staff, other agencies, the Tribes, state governments, and other "customers" for BLM information.

Since much of the Bureau's natural and man-made resources data is geospatial in nature, and the programs need ready access to it, the data must be maintained in Geographic Information Systems, and must be accessible over internal networks and the Internet (except as constrained by legal factors). Such nation-wide access to data, as well as the legislated customer service goals for E-Government, cannot be met without creating and applying uniform data standards.

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[1] Fortunately, geospatial data standards are accounted for in the national mandate of the Federal Geographic Data Committee, and present no contradiction with anything in this guidance.

[2] "Corporate data are those data and their derived applications which are shared or exchanged across administrative units, used repetitively through time, applied in decision-making, and/or released to the public and others." (I.M 2001-202, August 8, 2001.) Note: This document will use "data" as a singular noun throughout.

[3] Metadata is information about a data set that tells the user about the source, nature, quality, and other characteristics of the data that affect how it can be used.

It is not certain how much of the data used by BLM is collected and stored in accordance with formal standards. Not all resource data conforms to formally-adopted national standards. Informal standardization has been imposed on much business data by the input requirements of major software applications, such as LR2000, but these input requirements do not serve all purposes of data standards. In some cases, ad hoc standards have been adopted by states or regional consortia, but are not used throughout the BLM.

Future efforts to collect new data are expected to conform to an appropriate data standard, preferably one that is national in scope. This will cause a gradual evolution from non-standard data to standardized, documented data that can be more easily defended and shared. In addition, all data requires metadata collected to one or more national metadata content standards. All geospatial data must have metadata that meets the Geospatial Metadata Content Standard of the Federal Geographic Data Committee (FGDC).[4] A similar format for metadata about non-geospatial data is scheduled for release this year.

The metadata content standards are not independent of the standards for data. Metadata standards must be applied as the data is collected, by completing the associated metadata in parallel. Because metadata content has to be collected with the data, the data standard itself must support the creation of the descriptive information that will be stored in the metadata record.

One implication of adopting a new standard is that existing data in active use should be retrofitted to meet the standard. However, retrofitting existing data to a new standard can be expensive, and even infeasible. Data standard adoption teams will make recommendations on what data to retrofit, and on what schedule, based on business needs and their subject matter expertise. The decision whether to follow those recommendations will be made on a case-by-case basis by the affected BLM business programs.

Note that "retrofitting" data implies modifying a *copy* of an original data set. The original data set is itself subject to all the dictates of the Records Act and BLM Records policy, and will not be disturbed.

FGDC defines standards as follows:

> "Standards are statements of fact, quality, procedures, or content, to which applicable entities are compared for purposes of acceptance and/or use. Standards are used to justify decisions, implement policy, and can be designated as either voluntary or mandatory with respect to usage. They are documented agreements that contain or specify technical or other specific criteria to ensure that processes, products, or services meet their intended purpose . . ."

Similarly, P.L. 104-113, the "National Technology Transfer and Advancement Act of 1995" defines a standard, generically, as:

[4] Required by Executive Order 12906 dated April 11, 1994.

(1) Common and repeated use of rules, conditions, guidelines or characteristics for products or related processes and production methods, and related management systems practices.

(2) The definition of terms; classification of components; delineation of procedures; specification of dimensions, materials, performance, designs, or operations; measurement of quality and quantity in describing materials, processes, products, systems, services, or practices; test methods and sampling procedures; or descriptions of fit and measurements of size or strength.

The BLM format and mandatory content for new BLM data standards is provided as Addendum 1. The BLM data standard content is conventional, and includes three main elements:

1. Introduction – General information about the standard, such as what data it covers, who is affected, how it relates to the logical data model of the Bureau Architecture, and who the data steward(s) are.
2. Data Set Characteristics – Detailed information on security and release conditions, collection and maintenance, and quality control and assurance.
3. Data Model Characteristics – Detailed description of the logical data schema, entity names and defining characteristics, and relationships.

A good data standard is independent of any particular technology, product, or software application. It is free from proprietary restrictions of any kind.

What is meant by a "BLM national data standard"? For BLM purposes, a national data standard is an agreed set of rules or terms for a data entity (or set of entities) that applies to collection and use of that data entity within the BLM.

Whenever feasible, BLM will adopt—not duplicate—data standards from the Federal Geographic Data Committee (FGDC), International Standards Organization (ISO), Federal Information Processing Standards (FIPS), industry-sponsored consensus standards groups, and Federal and State agencies. No new standard adoption effort will be undertaken if any such external opportunity exists.

Preferably, most BLM data standards will be adopted from, or developed in cooperation with, other Governmental organizations or industry standards-setting bodies. OMB Circular A-119 authorizes and encourages Government agencies to participate in industry consensus standards groups, in order to establish data standards that serve the needs of related Government agencies and of industry. Further, the Government Paperwork Elimination Act, the Paperwork Reduction Reauthorization Act of 1995, and Section 515 of the Treasury and Consolidated Agencies Appropriations Act of 2001 ("Data Quality Act"), mandate fundamental changes in the methods of Federal information processing and dissemination. These changes can only be achieved when the information to be managed and shared is standardized across the BLM.

As a practical matter, not every BLM standard can be national. At least three situations can justify a State-level or regional standard:

1. A resource (or a certain characteristic of a resource) is unique to one or a few BLM jurisdictions.

2. No national standard exists or can be created quickly enough to meet a pressing business requirement.
3. BLM is one participant in a multi-agency cooperative study or land management effort, or has entered into a data collection and sharing agreement with external partners (other Federal agencies, state government, Tribes, and non-Governmental organizations) and must conform to standards adopted for that particular purpose. This can also occur when a State standard is dictated to the BLM by law or agreement.

Even in these cases, the data standard adoption team for the particular data topic should be asked to help investigate alternatives and to take part in the decision process. As a matter of BLM policy, adoption and use of a national standard is preferred, and managers who approve State or other standards for a specific purpose must be prepared to document and justify that decision.

Where non-national standards are adopted, those standards should extend and incorporate existing components of any related national data standard. That is, State and other standards may add to, but should never be inconsistent with, a related national standard. The resolution of any inconsistencies or technical conflicts must be resolved by the data standard adoption team as part of its regular deliberations.

It would be unrealistic to ignore the fact that relatively little of the BLM's data conforms to a national standard from any source. In most business areas, it will be necessary to adopt an evolutionary approach to attaining standardization. However, making measurable progress toward standardization is not optional.

It is a major responsibility of each National Data Steward to identify, assess, compile and maintain the status of standards and business data in progressing toward standardization. The National Data Steward will accomplish this by establishing a Bureau-wide standing committee of State and Field data stewards for their category of data. This compilation will indicate the timing and strategy for adopting and applying national standards, and be consistent with State or local extensions of those standards to meet BLM business needs most effectively.

Data stewards can adopt any workable combination of tactics for evolving toward the desired standards. For example, one approach is to accept temporary use of a local standard, while "mapping" or "aliasing" the names and definitions from one standard to another. Because this is so time-consuming, it may be feasible only in a few critical situations. Another tactic is to obtain national program management agreement on the "core data" within a business program, and to focus efforts on those first. (Core data is that data for which BLM is the logical lead organization to establish Government-wide standards.) This tactic could include finding and adopting national standards from other agencies and organizations that have (or ought to have) primary responsibility for them.

The process presented here was adapted from the product of an intensive interagency effort during the late 1990s, which resulted in draft models, definitions, and guidance, but was never formally implemented.[5] The Standards Sub-Committee of the Inter-organizational Resource Information Coordinating Council, Portland, Oregon (IRICC), worked more than a year to develop a process that would work among the participating agencies, and also within those agencies. Participating agencies were the BLM; Forest Service, U. S. Department of Agriculture (USDA); Washington Department of Ecology; U.S. Fish and Wildlife Service; and the Oregon State Office for GIS.

The Standards Task Team, under Data Management Plan 2001[6], has modified the IRICC process models and definitions to generalize them to all types of data standards, and to match the conventions for process and information modeling under the Bureau Enterprise Architecture (BEA) effort. These changes preserved the interagency emphasis, and the version documented here should work well for any level of cooperation with other agencies or industry groups. For internal standards projects, these processes can be streamlined judiciously, while preserving all consultation and approval steps.

3.0 Roles and Responsibilities

Key jobs must be assigned and performed in order to adopt a data standard. High-level definitions of data management roles and responsibilities have been created by the Roles and Competencies Task Team of Data Management Plan 2001, and will be published shortly in an Instruction Memorandum. Further details on those roles, as they apply to data standards, is provided in this document. For the specific purpose of adopting, implementing, and maintaining data standards, these roles may be summarized as follows. For simplicity, these descriptions refer to a new national standard. For a state or other standard, responsibility moves away from Washington Office (WO), and state personnel will perform leading roles.

1. National Data Steward–responsible for coordinating management of data associated with an assigned business topic. The National Data Steward will create and lead a BLM-wide team of subject-matter experts (within the current BLM organization structure) to make decisions about this data. These subject-matter experts will include many of the state and field office data stewards.

   The National Data Steward will maintain a consensus list of priorities for national data standards adoption. The National Data Steward will assist each data standard adoption team with planning, communications, and justifications. The National Data Steward will inform all interested parties of the status of existing and proposed national data standards on a regular basis, and will promote re-use of the standardized data by all business activities that require it. The National Data Steward is responsible to ensure that new standards, as well as all modifications of standards, are supplied to the SCO Data Group for incorporation into the CMR.

2. Data Standard Adoption Team Leaders ("Team Leaders")–lead BLM participation in a standard adoption project. The data standard adoption team leaders can be appointed from any

[5]"Guidance for the Development and Implementation of Interagency Data Standards," Report of the Interorganizational Resource Information Coordinating Council, Portland, Oregon. DRAFT dated September 3, 1997. Process models were supplied separately.

[6]Bureau of Land Management, USDI. Data Management Plan 2001, Version 2.0, October 11, 2001.

organizational level of the BLM, and will normally be State or field office data stewards for the data in question. The Team Leader is responsible for achieving a defined project goal within time and resource constraints.

The Team Leader will also ensure that the standards effort complies with all DOI and Government-wide directives concerning implementation of the Extensible Markup Language (XML), including mandatory creation of XML vocabularies.

3. Bureau Data Administrator–responsible for leading, maintaining, and evaluating compliance with these procedures for adopting data standards.

4. State Data Administrators–responsible for communicating state and local needs to the Bureau Data Administrator, and communicating and implementing directions from the Bureau Data Administrator. The State Data Administrators assist the National Data Stewards to inventory and maintain standards status and priorities.

5. Data Standard Adoption Teams–support the data standard adoption team leaders as requested, and coordinate review of draft standards by all interested parties. These teams may continue intact throughout the life of the standard, with membership evolving as needs change. Data standards also are expected to evolve, and this team is responsible for comparing the relative costs of not changing standards to the costs of changing the standards and implementing the changes. Recommendations on the desirable composition of a data standard adoption team are provided as Addendum 2.

6. Program Leads—responsible for ensuring that funding for approved standards efforts is allocated, and the protected from diversion to any other non-emergency purpose. Responsible for ensuring that the personnel resources are available and managed effectively. Program leads must actively support implementation of national data standards, by ensuring that data collected under their jurisdiction meets the standard and the associated metadata requirement, and by ensuring accountability for success and failures.

Where these roles are played in each step is explained in the detailed process descriptions that follow.

Assistance from the Bureau Enterprise Architecture Team and Corporate Metadata Repository (CMR) Team

The BEA Team is positioned to provide ongoing support and guidance to internal BLM business activities that seek to develop or adopt data standards. The BEA Team can provide the following services:

- Provide data architecture guidance required in the adoption and/or creation of data standards.

- Perform analysis of data identified during data standards development. This would include review of new data designs and/or modifications to existing data structures.

- Perform a systems and data impact (the business process impact is addressed as part of business process re-engineering) analysis related to the adoption and implementation of data standards and help develop migration plans to move from the as-is standards to the new standards.

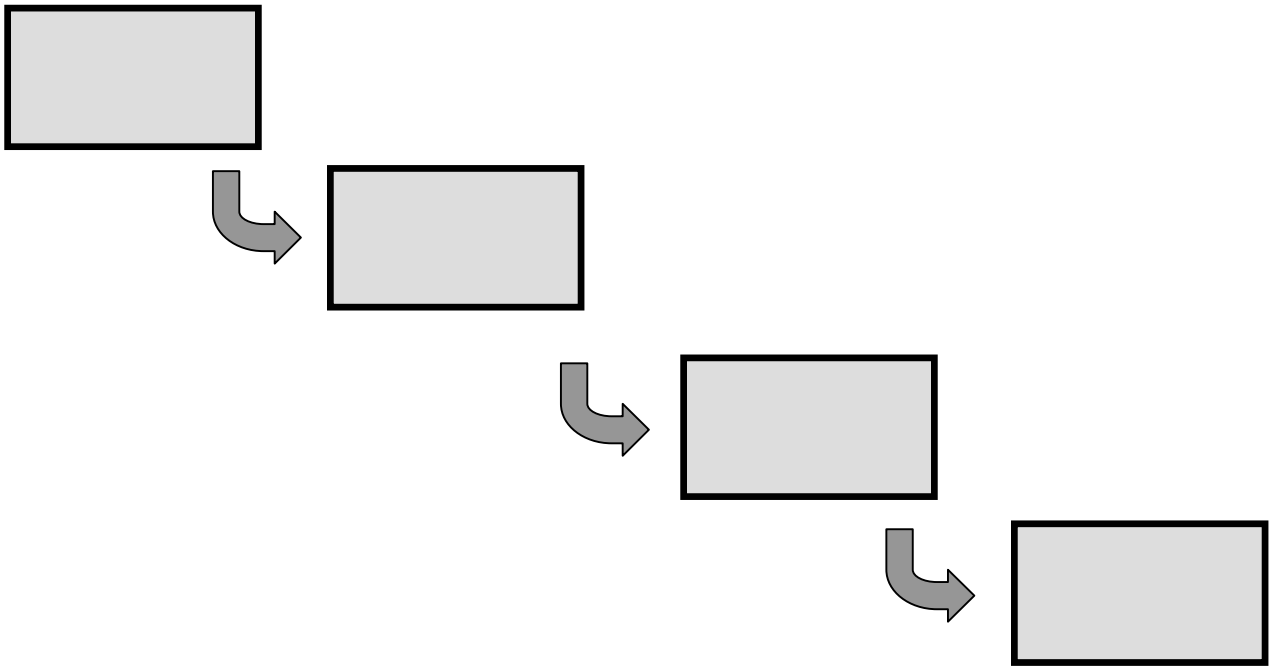
- Coordinate data modeling activities and/or provide direct data modeling services.

- Facilitate the collection and publication of data standards in the Corporate Metadata Repository

The BEA Team, with the assistance of the Corporate Metadata Repository (CMR) Team (SCO Data Management Group), is in the process of defining a methodology and format for documenting business rules. The development of data standards result in collecting this type of information.

4.0 Overview of the Steps

Figure 4.1 shows the four main processes in managing a BLM data standard, from first identification of need, through maintenance and eventual retirement and replacement of the standard. The attachment numbers in parenthesis in each box below refer to the attachments noted in the process models illustrated in Addendum 3.



Attachment 3-1 shows the process of standards adoption in more detail. This and the other attachments are presented in the specific format of all BEA business process models. This diagram represents the highest level model of data standards management. Attachments 3-2 through 3-5 show how each step of the high-level process is broken down into smaller steps. The data standard adoption procedure involves four major steps:

A. Propose Data Standard. A request for a new data standard begins the process. This request comes from a BLM business program, represented here by the BLM business process "*2.4 Conduct Information Collection*." As a practical matter, the requirement normally will be identified by the National Data Steward and other subject matter experts. The National Data Steward sets a priority based on business needs and resources. The steps under "*Propose Data Standard"* produce an approved proposal.

B. Adopt Data Standard. Approval of this proposal triggers all the steps to research, coordinate, draft, obtain consensus, and complete a data standard, which is documented in a Data Standard Report. The Data Standard Report publishes the new standard, and also provides information on need, sources, participation, and implementation.

C. Implement Data Standard. This step begins with developing an implementation plan, to prioritize and schedule the transition of existing data and new data collection to the new standard. Implementation may require years, and the new standard may never be applied to older data sets that are never used for current decisions.

D. Maintain Data Standard. Once approved and implemented, a standard will be assessed periodically for adequacy and usefulness, and the need for any changes will be evaluated regularly. In this step, changes are made and implemented whenever business needs justify the effort. This process includes archiving data standards as dictated by the Federal Records Act.

Addendum 4 shows the roles of Washington Office, state, center, and field personnel in managing data standards. The first table shows where the responsibilities lie when a national standard is adopted. The second and third tables show responsibilities for State-level and field office standards respectively. Differences between the last two tables are very slight, because it is expected that new standards at the field office level will be coordinated throughout the State, and will become, in most cases, part of the State's suite of data standards, even if used only in one area. For simplicity of presentation, the descriptions of roles in Sections 5.0 through 8.0 are based on adoption of a national standard. If a project is addressing a State level standard, the lead data steward will be the State Data Steward, and certain other roles also shift downward in the organization, as shown in the Addendum 4 tables. Throughout this section, the term "appropriate data steward" means the right data steward for the data category, located at the right organizational level to lead the effort.

Sections 5.0 through 8.0 describe these steps in more detail. First, each step is summarized in an overview. Then, each step is covered in more detail.

5.0 Propose Data Standard

In summary, proposing a new data standard requires the following steps:

1. The BLM business community requests the appropriate National Data Steward to provide a new data standard. (In general, the Data Steward will serve as a conduit to the affected business community.)
2. A data standard adoption team leader and data standard adoption team are appointed by the National Data Steward, and they then develop a proposal for the new standard. This proposal sets out all the information needed by management to decide whether this effort should go forward.
3. The draft proposal is evaluated by the business community, State Data Administrators, and others, and eventually is finalized by the data standard adoption team. A request for approval is routed to management of the benefiting activities. If approval is received, the approved proposal advances to the next step, "Adopt Data Standard."

Addendum 5 shows the steps involved in proposing a new data standard.

Proposing a new data standard will involve two steps: first developing, and then evaluating the proposal. The entire standard adoption job begins with receipt of a request for a new data standard from the benefiting BLM business activity. Each National Data Steward will be charged with creating and maintaining a transition plan, which contains a prioritized list of requirements for new standards that fall within the Steward's area of responsibility, against which the need for this standard will be gauged. For

example, the National Data Steward for widgets may recognize pressing needs for three new national data standards applicable to widget dimensions, widget inventory, and widget appearance, in that order

of importance. The three would be included in a transition plan that reflects relative priority, target dates, and rough estimates of resource requirements. A proposed new widget standard that does not appear high on the business priority listing in the transition will not be approved, unless and until consultations with a business activity result in raising its priority.

Major standard adoption efforts may best be managed as formal projects. In those cases, the data standard adoption team will develop a scope, strategy, work breakdown structure, schedule, and budget for BLM participation in adopting the standard, and will track progress and costs throughout. The team will identify stakeholders, within and external to BLM, who will be included in reviews of team products. The team will consult with other organizations (including, *always*, the Corporate Metadata Repository Team and the SCO (DWO-570) to (1) ensure the new standard does not duplicate suitable existing or emerging standards; and (2) ensure the widest appropriate participation of government and industry in the standard adoption process. Straightforward adoptions of existing standards may dispense with the more formal elements of project management, but this should not be seen as license to skip formal approvals or coordination processes set out in this guidance.

The National or State Data Steward will identify a data standard adoption team leader, and obtain necessary management approvals. The data standard adoption team leader will nominate appropriate specialists to participate in a data standard adoption team, and will obtain management approvals.

In the first step, the data standard adoption team produces a draft proposal to adopt a data standard. The content requirements for a data standard proposal are given in Addendum 5. A proposal is desirable because of the significant commitment of labor and travel funds implied by some of these jobs, and to communicate to all interested parties the intended scope and participation by industry and government in the effort. As indicated in Addendum 5, the data standard adoption team may request further information or clarification from the business source of the request for the data standard. This request will be coordinated by the National Data Steward.

The desired content of a standard adoption proposal includes information on the scope and need for the data standard, specific business benefits, the overall schedule and milestones, participants and stakeholders, data quality issues, and program impacts of adopting this standard. An important element of the proposal process is evaluating if existing external standards will serve the need, or if parts of one or more existing standards can provide a useful starting place.

Formal evaluation of the draft proposal is the first opportunity to engage all the reviewers who represent stakeholders in this project. The data standard adoption team leader will ensure that reviewers get this opportunity, and that their concerns and suggestions are considered. The review process must include the appropriate levels of management. (See Addendum 4 for manager responsibilities.) When a final proposal is ready, the data standard adoption team leader will forward it, through the National Data Steward, to Bureau Data Administrator.

6.0 Adopt Data Standard

Adopting or developing the new data standard involves four major steps, as follows:

1. The data standard adoption team produces a draft report by going through the steps approved in their proposal.
2. A broader audience of reviewers, including the business community, evaluates the standard.
3. Evaluation results provide the basis for preparing a final standards report, which goes through a review cycle.
4. After comments have been addressed, the final data standards report goes through the formal Instruction Memorandum approval process.

The adopted final standard then is routed to the SCO Data Management Group, which then adds it to the BLM's central standards database in the CMR.

Addendum 3 illustrates the steps and information flows required to adopt a data standard.

The major work of adopting a data standard will be performed by the data standard adoption team and data standard adoption team leader. This team may include members from outside BLM, and in fact, could be led by a representative of another organization. In such a case, the BLM data standard adoption team leader still is appointed, and manages the BLM team participation and approval processes.

Work on the standard begins when resources are allocated by management. An Assistant Director typically will serve as the project sponsor for national standards; the State Director for State-level standards. The methods used to adopt the draft standard are adaptable, and will vary with the situation. However, any method should include at least the following steps:

a. Establish team administration rules and agreements to govern membership, resolution of disagreements, and meeting schedules.
b. Coordinate and interact with related standards development or maintenance efforts. Review existing standards and formats, as well as common practices in the field, to confirm the earlier, proposal phase determination of whether, and to what extent, this effort can build on existing standards and experience.
c. Maintain continuing informal review by a broad spectrum of professionals in the affected field, in order to migrate successive drafts toward a consensus that serves most needs, and that will survive formal review in subsequent steps.
d. Perform formal project management. This is especially important in this particular step, because the constant reviews may very well yield recommendations to expand or redirect the scope of the standard. Changes in scope may be perfectly appropriate. However, the data standard adoption team leader must ensure that any proposed change in scope is evaluated for impacts on the work breakdown structure, schedule, budget, and risks.
e. Create thorough documentation of team meetings, decisions, and products. These must be managed and maintained according to the dictates of the Records Act, during and after the project.

f. Perform formal testing of the draft standard, against a challenging variety of data sets.
g. Conform to OMB Circular A-119, Executive Order 12906, and any other relevant directives.
h. Ensure that the effort complies with all DOI and Government-wide directives concerning implementation of the Extensible Markup Language (XML), including mandatory creation of XML vocabularies.
i. Develop implementation cost estimates, i.e., the direct cost of changing a standard and obtaining new consensus; the costs to BLM in lost productivity during the conversion; and the costs associated with modifying data bases, data content, metadata, and automated applications that employ affected data.

In cases where a standard is developed cooperatively with another agency or an industry consensus standards organization, the particular standard development process may be dictated by that organization. If, for example, a standard is being developed under the umbrella of the American National Standards Institute (ANSI), the ANSI processes will be appropriate. If the standard development process is internal to BLM, or there is no prescribed process, BLM data standard adoption team leaders should use or adapt the processes set forth by the FGDC. Detailed guidance for every step of the FGDC process can be found at: http://www.fgdc.gov/standards/directives/directives.html

It is required that FGDC procedures be followed wherever feasible. When it is not feasible, the team lead will document the rationale and transmit it to FGDC as feedback on their process.

All of the remaining steps of "*Adopt Data Standards"* address review, revision, and adoption of the draft standard. The exact steps also may be dictated by mandatory processes of another organization, but the processes described here are generic. Use these steps for internal BLM standards adoption. If an external methodology is used, ensure that the same basic work and information flows are included.

Refer again to Addendum 1 for the format of a new BLM standard report. The draft report includes three main parts:

1. General description of the standard
2. Characteristics of the data sets
3. Characteristics of the data model.

The introduction to this report should update the information from the proposal document about scope, purpose, benefits, stakeholders, criteria, and implementation costs, plus describe the participants, processes, comments, and conclusions of the study itself.

After a draft team report has been completed, it is sent to the stakeholders for their review and comment ("*Evaluate Draft Data Standard Report"*). (The data standard adoption team will determine its stakeholders early in the project, and will update this list as needed throughout the project.) Their evaluation should be guided by any criteria, requirements, or directives regarding the standard that may be provided by the business component of the BLM or other participants. These criteria, at a minimum, would include the original statement of requirements that initiated this standard-setting effort. The evaluation process also may include sending the draft report to reviewers from the public, other affected

agencies, and any regulatory bodies that could be affected. For example, a river management commission may be vitally interested in the exact nature of water quality data that will be collected after a new standard is adopted.

The data standard adoption team leader will consolidate all stakeholder comments into a record document or memorandum, with an indication of the appropriate disposition of each. Depending on the extent of revisions required, the manager then will pass the comments back to the data standard adoption team with instructions either to redraft the standard, or prepare a final standard report. If a redraft is required, the result must be routed back through the evaluation process.

The final, fully-reviewed standard report is forwarded to the appropriate National (or State) Data Steward, who will coordinate approval steps with the Bureau Data Administrator, the sponsoring Assistant Director, and others who may have approval authority. An approved final data standard, which will be surnamed and issued as an Instruction Memorandum, is routed by the National Data Steward to the next process step, *"Implement Data Standard*," and to the SCO Data Management Group, to ensure that the new standard is listed in BLM's Web-based central standards database in the CMR.

7.0 Implement Data Standard

Implementing a new data standard or modification means putting it into effect for new data collection, and converting existing data to the standard when cost-effective. The implementation steps are:

1. Develop an implementation plan, to structure Bureau-wide work on implementing the standard.
2. Implement with oversight and reporting by the data stewardship team.

The process model labeled Attachment 3-4 in Addendum 3 shows the steps involved in implementing a new data standard.

Implementing a new standard normally will be a long-term process. All new data that is collected will conform to the new standard. Modifying existing data sets into conformity will proceed only as business needs dictate. Collection of new data to the standard may require significant changes to existing software and data bases, and may be delayed. Business needs may dictate that one existing data set be retrofitted to the new standard immediately, while other data sets transition only as new data replaces old. These business needs are incorporated into an implementation plan, created and executed in this step, as follows:

1. After the final data standard has been approved, the data standard adoption team will coordinate the creation of a practical implementation approach, in close cooperation with the National Data Steward and all stakeholders. Extensive coordination is required because only BLM business interests can specify priorities and long-term schedules, and make credible estimates of the costs and labor required. If this step is performed effectively, the development and evaluation of the implementation plan will be simplified.

2. Having outlined a general approach, the team can proceed to develop a formal implementation plan. The implementation plan should include all the elements of a project plan, to include scope and objectives, success criteria, methods, responsibilities, work breakdown, schedules, budgets, and risk assessment.
3. This plan will receive widespread review by the established list of stakeholders, and any concerns will be addressed.
4. The final implementation plan will be submitted for BLM management approval and funding. The plan will be implemented by an Instruction Memorandum.
5. An approved implementation plan will be executed under leadership of the National Data Steward. The National Data Steward and data standard adoption team leader will decide whether the data standard adoption team should be retained over the entire implementation period, and in what capacity.

A suggested format for each data standard implementation plan is provided as Addendum 6, with explanatory text.

8.0 Maintain Data Standard

Maintaining a data standard is an organized activity to monitor how well the standard is meeting needs, and to authorize and execute changes when appropriate. Changes, in turn, must be implemented and recorded in BLM's central data standards repository. This repository is currently part of the Corporate Metadata Repository.

Basic work steps in maintaining a data standard are shown in the process model labeled Attachment 3-5 in Addendum 3.

The direct responsibility for maintaining a standard will lie with the National Data Steward. The National Data Steward may retain the data standard adoption team, or a successor team, as a long-term consultant to perform the maintenance steps listed below.

Maintenance steps will typically include the following:

1. Evaluate Data Standard Usefulness Solicit and analyze feedback on how well each standard is working ("*Experience Report*"[7]). Also, evaluate the actual adherence of data content to each data standard, as an indicator of problems or inadequacies in the standard. Ensure that the experience and interests of external agencies and customers are considered fully—a revision will have impacts beyond the bounds of the BLM. Implementation of any data standard, as well as programmatic experience in using the standard, may generate requirements for changes to the data standard. These would normally begin the maintenance process for a data standard.

[7] The term "experience report" does not imply a set format or scope. It is intended that information on how well the standard is working will be solicited and compiled in one summary table or report, before decisions are made to modify the standard.

2. Evaluate Change Request Evaluate requests for changes to determine whether they are valid and whether they represent a need to modify the data standard, or whether this is simply a minor maintenance need. This evaluation requires a balancing act by the data standard adoption team. Standards are often compromises, and the data stewards will have to balance the value of changing a standard against the problems and costs associated with updating and modifying the standard, the actual data governed by the standard, and the metadata.

3. Modifications A "modification" requires changes to the structure or definitions of the data standard. These are the type of changes that would cause existing data to be re-collected, edited or converted to meet this new structure or definition. Some examples would be: the addition of new data elements; the splitting of an existing data element into multiple data elements; or redefining a data element so that the meaning is different than originally established. A modification request would be forwarded to the "proposed data standard" process to go back through the steps involved in proposing a data standard (thus ensuring that all stakeholders are aware of this proposed change and agreement has been reached).

4. Maintenance "Maintenance" does not significantly change the structure or definitions contained in the data standard. These are minor changes that would not cause the re-collection or edits to data. Examples might be correction of spelling or the addition of a domain value that is within the original confines of the data element. Maintenance requirements are forwarded to the "revise data standard" business process to implement the change.

5. Revise Data Standard Make maintenance changes to the data standard. The revised data standard is sent to the SCO Data Group for posting to the central standards database in the CMR.

6. Evaluate Usefulness of the Revised Standard Periodic evaluations will provide information to the National Data Steward about when it is necessary to repeat the whole revision cycle above.

7. Retire and Archive Standard Standards that are no longer needed, or suitable for the revision process, will be formally retired, by Instruction Memorandum, and archived along with all records associated with their development, revision history, and use with decision data.

9.0 Information Resources

1. OMB Circular A-119 "Federal Participation in the Development and Use of Voluntary Standards", Transmittal Memorandum dated 02/10/98. Available at: http://www.whitehouse.gov/omb/circulars/index.html

2. Guidance for project management provided by the System Coordination Office, WO-570D, at http://web.blm.gov/sco/sco_homepg.html

3. BLM Technical Reference Model, Volumes 1 and 2, available at: http://web.blm.gov/nirmc/syseng/ita.html

4. Detailed guidance for every step of the FGDC process can be found at: http://www.fgdc.gov/standards/directives/directives.html

Addendum 1
Format and Content for a Data Standard Report

Format and Content

1. **Introduction** – This section provides general information about the data standard**.**

    a. **Description of Standard** – Describe the type of data being covered by this data standard. Is the data spatial or non-spatial? What are the topic areas that are covered by the standard?
    b. **Affected Groups** - Who is affected by the standard, or, who should care about the standard? Who is the sponsor of this standard?
    c. **Sponsor** – who will be the business sponsor of this standard adoption effort?

2. **Data Category – link to BEA** – How does this standard fit into or support the BEA? What data subject area within the Architecture does this standard fall into?

3. **Data Steward Identification (including lead agency if appropriate)** – Who is the data steward for the data described in this standard? Multiple data stewards may be involved if the standard addresses more than one topic area (for instance, there may be different data stewards for birds and mammals yet they may both be addressed in one data standard). However, it will always be required that one appropriate data steward be in overall charge of each standard adoption effort. This normally would be the National Data Steward for Bureauwide data standards, a State Data Steward for State data standards. If another agency has the recognized lead for a topic area then that agency and the appropriate data steward within that agency should be identified.

4. **Data Set Characteristics** – This section identifies the characteristics of the data set as a whole.

    a. **Overall Security** – Identify the security (public/non-public) level of the data set. If non-public, identify why the data is considered non-public (e.g. contains cultural resource locations). Identify who (individuals, groups, public) will be granted "Create, Read, Update, and/or Delete" privileges.
    b. **Data Collection and Maintenance Protocols** – Identify any data collection and maintenance procedures that would apply to this data set (no matter how the data is being used or no matter what application is accessing/using the data).

        i. **Accuracy requirements –** What level of accuracy is required by the subject matter specialists? If the standard is dealing with spatial data then this may also include issues such as scale and spatial accuracy. This is closely tied to the next section on collection and input protocols.
        ii. **Collection and input protocols** – What are the approved methods for collecting and entering the data? (Citation of source is sufficient.)
        iii. **Update Procedures -** Identify any special update procedures that may relate to the (such as issuance of annual bills) then that should be identified in the data standard. data standard. For instance, will updates be done on a case file basis, township basis,

field office basis? How often will updates be accomplished? As needed? Once a month? Once a year? This may also identify the minimum update requirements. For instance, if a database needs to be accurate as of a certain date for some business process

c. **Data Quality** – Describe data quality measure that will be applied to the data, either during data entry/edit or in some other manner.

   i. **Transaction level data quality** - What data quality measures are put in place to maintain quality during data entry/edit?
   ii. **Monitoring level data quality** - What kind of systematic review of data quality will take place and how will it be done?

d. **Relationship to Other Standards** - Identify any other data standards that are related to this standard in some way. This may be a standard on a similar topic, one that sets umbrella standards that this one must meet, etc. An example may be a state or local standard that is an extension of a national standard.

5. **Data Model Characteristics** – Each data standard is to be supported by a data model. Data models contain more than just a "picture" of the data set. It also contains details about the entities and relationships between those entities.

a. **Schema (graphic) –** A graphical depiction of the data described by this data standard. For the purposes of the data standard, only a logical data model is required. This shall conform to the formats, nomenclature, and definitions in the BEA enterprise logical data model, and at a minimum, shall be mapped to the lowest level of disaggregation provided in that model.
b. **Entity Descriptions** – Descriptions of the places, persons, things, concepts that are described by the data set.

   i. **Structured data element names** – Use the BLM structured data element naming convention (entity modifier(s) classword) to name all data elements (attributes) that are part of the entity.
   ii. **Data element definitions** – Provide definitions of each data element that are clear, complete and free of jargon. Include the attributes of the data element as part of the definition, and avoid using the data element name to define itself.
   iii. **Field size/data type** - Identify the field size (number of characters, number of digits, etc) necessary to hold the information for this data element. Also identify the type of data this element contains (character, integer, date, etc).
   iv. **Domain codes and definitions** – If the data element contains codes then list and define all codes or refer to another authoritative source for the codes.
   v. **Entity/Data element security -** Security considerations (public/nonpublic) for individual data entities and data elements.
   vi. **Data Steward** - Identify the data steward for each entity and data element (if different data stewards are responsible for portions of the entity).

c. **Relationships between Entities** - Identify how the different entities represented in the data model relate to each other.
d. **Business Rules – The business rules under which the data is used and modified.**

6. Other Material - Any other supporting material that aids in the understanding or use of the data standard. This must include specific geographic, organizational, or applicability constraints for non-national standards.

Addendum 2
Suggested Data Standard Adoption Team Composition

Suggested Data Standard Adoption Team Composition

Teams should be drawn from the following:

Core Team

National Data Steward (1) -- Lead
State Data Steward(s) (2)
Data Administrator (1) **OR**
Data Analyst
Subject Matter Experts (3)
    2 Field Offices
    1 State Office
    1 National Science and Technology Center
Database Administrator
Technical Expert (i.e. GIS, Security, Records)
Facilitator (when necessary)

Stakeholders and Reviewers

All State Data Stewards
All State Data Administrators
Bureau Data Administrator
Appropriate State Office Program Leads (or equivalent)
Bureau Architecture Representative
Appropriate DSD
SCO Data Group
Security Representative
Records Representative
GIS Coordinators
IRM Advisors
Stakeholders in External Agencies and Organizations

General Notification (information copies; comments optional)

Other National Data Stewards
Configuration Management Board Representative

Addendum 3

Data Standard Adoption Business Process Diagrams

Attachment 3-1 Manage Data Standards (Summary of All Steps)

Attachment 3-2 Propose Data Standard

Attachment 3-3 Adopt Data Standard

Attachment 3-4 Implement Data Standard

Attachment 3-5 Maintain Data Standard

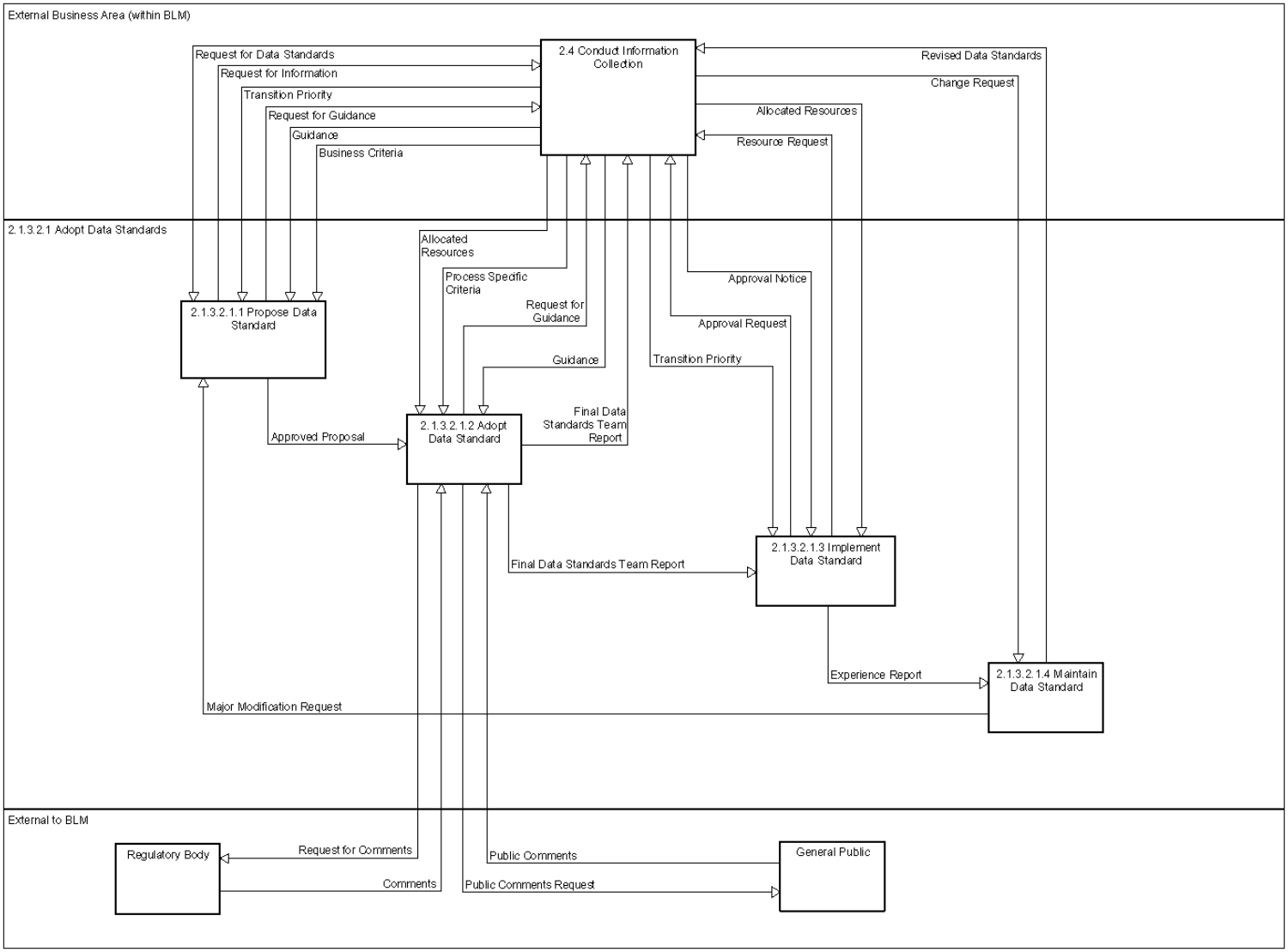
PLEASE NOTE:

One element of the Bureau Enterprise Architecture (BEA) is modeling business processes, existing and desired, for all work performed in the BLM. This process modeling is performed in facilitated workshops of BLM subject matter experts, and the results are recorded in a standard format. This format differs from the "flowchart" diagram that Information Technology (IT) professionals commonly use. Some key features of the BEA format are described below, to help you interpret the process charts that follow.

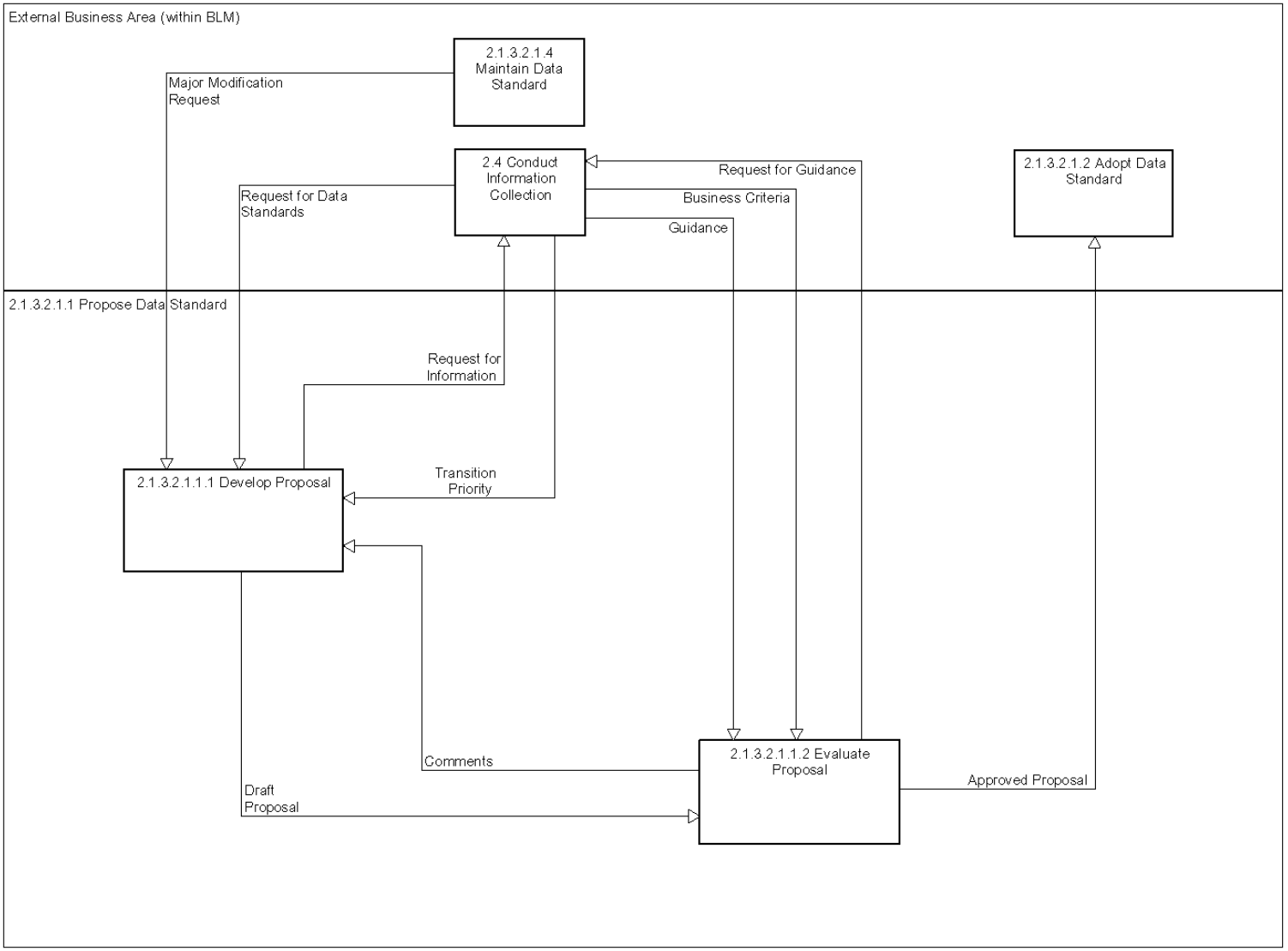
1. Figure 3-1 presents the four main processes required to adopt and maintain data standards. Each of these processes is depicted in a box, and each box is labeled with a phrase that tells what is accomplished in the box. All work of any kind is accomplished within one or another of the process boxes. Arrows between the process boxes show products of one process moving to the next process. These arrows are always labeled with the name of a product, and never with a verb (no work is ever assigned to an arrow—it is purely a routing.
2. Figures 3-2 through 3-5 provide detail on each of the four basic processes depicted in the overview diagram.
3. In all these diagrams, you will see two horizontal lines, which divide the page into three horizontal strips. The middle strip is where the process that this page focuses on will always be depicted. Processes shown in the upper strip, such as "2.4 Conduct Information Collection," are other BLM processes that are outside the particular process modeled on that page, but which feed products to this process, or receive products from it. Boxes in the lower strip, such as "Regulatory Body," are external to BLM.

Also note: in the following figures you will notice numbers above the figures such as 2.1.3.2.1. These numbers are carried over from BEA documentation where the figures originated, as are the Attachment numbers at the lower right of the figures.

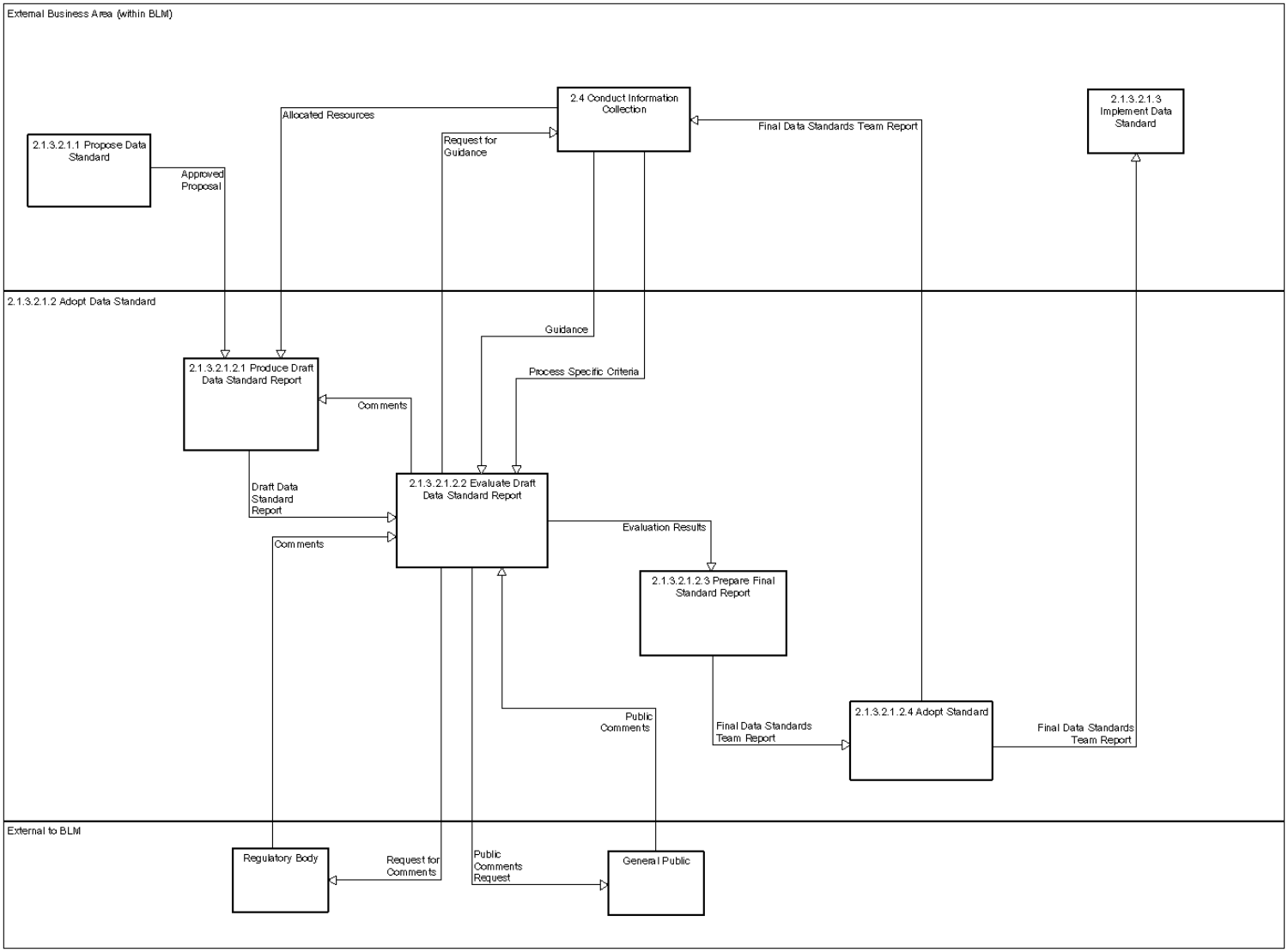
2.1.3.2.1 Manage Data Standards



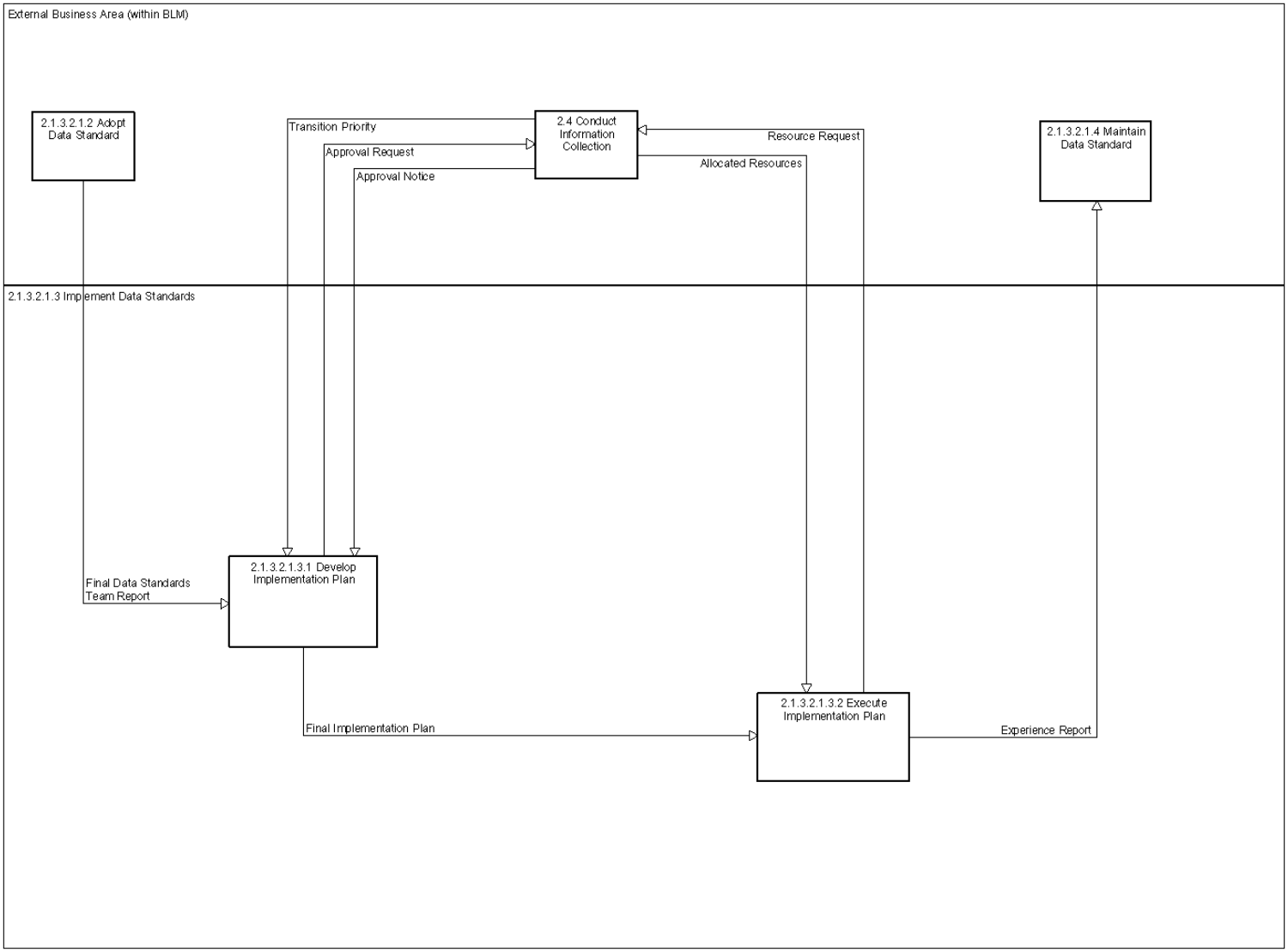
2.1.3.2.1.1 Propose Data Standards



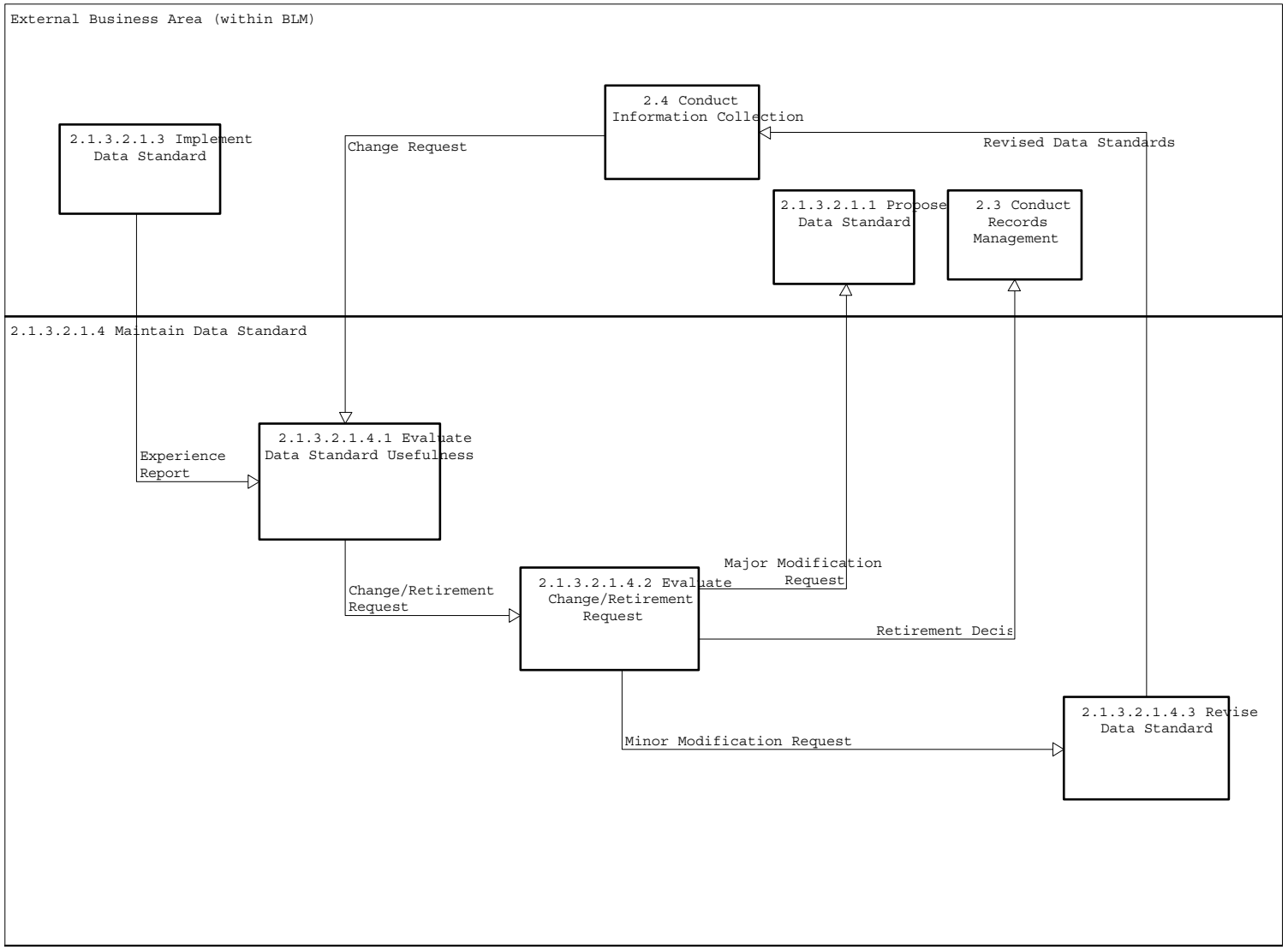
2.1.3.2.1.2 Adopt Data Standard



2.1.3.2.1.3 Implement Data Standards



2.1.3.2.1.4 Maintain Data Standard



Addendum 4

Roles in Data Standard Adoption, Implementation, and Maintenance

Addendum 4-Table 1 Roles in Adopting a BLM National Data Standard

NATIONAL STANDARD	2.1.3.2.1 Manage Data Standards										
	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility **S = Support** **R = Responsible** **C = Consult**	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director	R			R		R		R		R	
CIO											
Records Administrator	S	S		S		S	S	S		S	
BLM Data Administrator	S	L		L		L			L		
Data Steward (Team)	L	S	L		L		L	L	S	L	L
SCO Data Manager		S		S		S	S		S	S	
Group Manager	S	S		S		S	S		S	S	
Project Manager											
State/Center Roles											
Director	S			S		S		S		S	
CIO											
Data Administrator	S	S	S	S	S	S		S	S		S
Database Administrator			S		S		S	S		S	S
Data Steward (Team)	S	S		S		S	S	S	S	S	
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S			S		S	S	S		S	
Project Manager											
Resource/Program Specialist	S	S		S				S	S	S	
Resource/GIS Specialist	S	S		S				S	S	S	
Field Office Roles											
Manager	S			S		S		S		S	
Data Steward (Team)	S	S		S		S	S	S	S	S	
Project Manager											
Resource/Program Specialist	S	S		S				S	S	S	
Resource/GIS Specialist	S	S		S				S	S	S	

Notes: L* = One or the other will be lead

Note: All tasks are taken from the process model for adopting, implementing, and maintaining data standards. The tasks on this table expand on a task in the roles matrix for 1.3 Maintenance of Data ("Adopt, confirm, or establish data standards")

Addendum 4-Table 2 Roles in Adopting a BLM State Data Standard

STATE STANDARD	2.1.										
	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility **S = Support** **R = Responsible** **C = Consult**	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director											
CIO											
Records Administrator				S		S					
BLM Data Administrator				S		S			S		
Data Steward (Team)	S	S				S	S		S		
SCO Data Manager		S		S		S	S			S	
Group Manager				S							
Project Manager											
State/Center Roles											
Director	R			R		R			R		
CIO											
Data Administrator	S	L	S	L	S	L		S	L	S	S
Database Administrator			S		S		S	S			S
Data Steward (Team)	L	S	L	S	L	S	L	L	S	L	L
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S	S		S		S	S	S			
Project Manager	S			S		S			S		
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	
Field Office Roles											
Manager											
Data Steward (Team)	S	S		S		S	S	S	S	S	
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	

Notes: L* = One or the other will be lead

Note: All tasks are taken from the process model for adopting, implementing, and maintaining data standards. The tasks on this table expand on a task in the roles matrix for 1.3 Maintenance of Data ("Adopt, confirm, or establish data standards")

Addendum 4-Table 3 Roles in Adopting a BLM Field Office Data Standard

LOCAL STANDARD	2.1.3.2.1 Manage Data Standards										
	Propose Data Standard		Adopt Data Standard				Implement Data Standard		Maintain Data Standard		
L = Lead responsibility **S = Support** **R = Responsible** **C = Consult**	Develop Proposal	Evaluate Proposal	Produce Draft Standard Report	Evaluate Draft Standard Report	Prepare Final Standard Report	Adopt Standard	Develop Implement-ation Plan	Execute Implement-ation Plan	Evaluate Data Standard Usefulness	Evaluate Change Request	Revise Data Standard
National Roles											
Assistant Director											
CIO											
Records Administrator				S		S					
BLM Data Administrator				S		S					
Data Steward (Team)	S	S				S	S				
SCO Data Manager		S		S		S	S			S	
Group Manager				S							
Project Manager											
State/Center Roles											
Director	S			S		S				S	
CIO											
Data Administrator	S	L	S	L	S	L		S	L	S	S
Database Administrator			S		S		S	S			S
Data Steward (Team)	S	S	S	S	S	S	S	S	S	S	S
Data Architect (Modeler)			S								
Data Analyst								S	S		
System Administrator											
Records Administrator	S	S		S		S	S	S			
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	
Field Office Roles											
Manager	R			R		R				R	
Data Steward (Team)	L	S	L	S	L	S	L	L	S	L	L
Project Manager											
Resource/Program Specialist	S	S		S			S	S	S	S	
Resource/GIS Specialist	S	S		S			S	S	S	S	

Notes: L* = One or the other will be lead

Note: All tasks are taken from the process model for adopting, implementing, and maintaining data standards. The tasks on this table expand on a task in the roles matrix for 1.3 Maintenance of Data ("Adopt, confirm, or establish data standards")

Addendum 5

Proposal for a New Data Standard

DATA STANDARD PROPOSAL

PART I. GENERAL INFORMATION:

Name of Requestor:	**Date of Request:**
Name of Requested Data Standard:	**Data Affected:**

What purpose will this data standard serve (describe need, intended use)?

Who will perform this work, and in what FY(s)?_____

When will the work begin, and when do you expect to finish (fill in approximate dates below)?

Major Milestone	**Month/Year**
Obtain Approval to Proceed	
Appoint Team Lead and Form Team	
Review Draft Data Standard	
Submit Final Data Standard	
Obtain Final Approval (Target Date)	

About how many work-months of effort (BLM and contractor) will be required?

Does this data standard affect sensitive data (financial, business proprietary, cultural resources, Privacy Act, etc)? ____ Yes ____ No

If yes, what standard or directive governs access and protection?

_____

_____

PART II: INFORMATION ABOUT THE DATA STANDARD:

List and summarize the data that this data standard will affect:

Data Subject Area	**Description**

Which data stewards (National and/or State) are participating?

_____

_____

Does this data standard govern data in an existing or proposed automated system?

_____ Yes _____ No

If yes, which one(s)? _____

Is this system operational? If not, when will it be?

_____

Have the system owner, data steward, and project manager been consulted? _____ Yes _____ No

Have users of data affected by this standard been consulted? Please describe coordination to date: _____

_____

What are the main workload and budget impacts anticipated when this data standard is implemented (include BLM programs, public and other users)?

Affected Party	What is Affected?	What is the Magnitude of Impacts (Time, Costs, Staffing)?

Are there existing data standards for this data, or standards that could be extended for this purpose? Check with:

The national and/or state data stewards

Local GIS Coordinator

Corporate Metadata Repository

FGDC Geospatial Metadata Repository

State Data Dictionary for existing data attribute standards

Data Management Intranet web site

State or Field Office data standard: ____ Yes ____ No

BLM national data standard: ____ Yes _____ No

Industry data standard: ____Yes _____ No

Data Quality Specification:

Will this data standard include a specification of data quality requirements? Please summarize: _____

AUTHORIZATION:

Prepared By: _____ _____
Requestor Date

Reviewed By: _____ _____
National Data Steward Date

Reviewed By: _____ _____
Bureau Data Administrator Date

Approved By: _____ _____
Sponsor Date

Addendum 6

Data Standards Implementation Plan Format

Data Standards Implementation Plan

Orderly migration of the Bureau's legacy data to new standards will support data sharing and re-use, reduce data duplication and costs, and supporting the Bureau's transition to a more efficient Enterprise Architecture. However, migration can be costly, complex, and disruptive, if changes are not carefully planned and shared.

Direct responsibility for leading data migration to new data standards belongs to the data steward, at National or State level as appropriate for specific data sets. Frequently, multiple data sets from the States will require migration in a coordinated fashion, to minimize the very real potential for business disruptions.

The attached format is provided as an aid to data stewards in planning, tracking, and reporting on the progress their teams are achieving. This format will be completed at the outset of every data migration (even if only one data element is affected), and will be updated at least monthly throughout the process, and maintained until all data sets that are to be migrated have been successfully migrated.

In addition, the data steward is required to submit this form, and its monthly updates, to the SCO Data Manager, for posting on the National Data Management website. Through these web postings, all BLM professionals who are affected by data changes can obtain updates throughout the project, and will have the opportunity to communicate concerns or pertinent information to the data standard adoption team and data steward.

Any questions concerning the intent of boxes in this form, or the method of providing updates to SCO, should be directed to the SCO Data Manager.

Data Standard Implementation Plan					Date:
Data standard Level : ___ National __State/Center __Field				Data Standard to Implement:	
Data Set/Element to be Modified :					
Data Steward (Responsible Lead):					
Group Manager (Responsible over Data Steward):					
Target Date for Implementation:					
Role	Implementation Tasks Assigned:			Start Date	Completion Date
Data Steward (Lead)					
Data Administrator					
Records Administrator					
SCO Manager					
Database Administrator					
Data Analyst					
Resource /Program Specialist					
Resource/GIS Specialist					
Implementation Completion Dates: (Tailor these column headings to your project. However, arrange steps in order of priority to the business.)					
Data Element/Set	Lead	Start Date	Planned End Date	Actual End Date	Special Considerations